National Mathematics Advisory Panel: Critical Foundations for Algebra

Professional Development Lesson

Topic Summary

Classroom Connections are items or activities that can be immediately implemented in classrooms and are noted by CC*

Related Resources	Bradley Witzel (32 video clips) Instructional Innovations Unit Website Doing What Works Website
Materials Needed	Pencils, small groups, chart paper, manipulatives for "talking chips," and response cards

Step	*Description*	*Time*	*Target Audience (All, Educational leaders, teachers)*
Introduce	Use slide #1-3 to introduce yourself and the module. Introduce the use of response cards (slide #3).	5 min.	All
Explain	Use slide #4 to identify the research that this module is built upon-National Mathematics Advisory Panel Report.	1-2 min.	All
Present: Visual Diagram	Slide #5: Use this diagram to summarize the findings and recommendations of the National Mathematics Advisory Panel. Give participants Handout #1 so they have access to a read-able copy of this visual diagram.	3-4 min.	All
Multimedia Overview: *National Mathematics Advisory Panel*	Slide #6: Use the video to introduce Critical Foundations for Algebra	3:25 min.	All
Video: *Bradley Witzel Clip #5*	Slide #7: Bradley Witzel guides participants to identify topics of mathematics students struggle with.	5 min.	All

Mathematics Preparation for Algebra

Step	*Description*	*Time*	*Target Audience (All, Educational leaders, teachers)*
Video*: Preparing Students for Success in*	Slide: #8: Use slide to introduce the first practice recommendation: Mathematics Preparation for Algebra. As participants	8 min.	All

Algebra-multimedia overview	watch the video have them write notes about concepts they want to learn more about or components that their school needs to work on.		
Define Key Concepts	Slides #9-11: Use slides to define key concepts of the first recommended practice: Mathematics Preparation for Algebra. Careful to not read all of the slides to participants.	10 min.	All
Video: *Critical Foundations*	Slide #12: Show video where Dr. Fennell provides an explanation of critical skills and gives examples of number sense and fractions. He emphasizes the importance of establishing a coherent progression of skill development. Use Handout #2 for participants to take notes during this and then next 2 video clips.	9 min.	All
Video: *Benchmarks as Guideposts*	Slide #12: Show video where Dr. Fennell describes the development of benchmarks and how schools can use these as guideposts. These benchmarks should be interpreted flexibly. Use Handout #2 for participants to continue to take notes during this and then next video clip.	5:33 min.	All
Video*: Professional Development for the Critical Foundations*	Slide #12: Show video where Dr. Fennell addresses the importance of focusing professional development on mathematics content and pedagogy. Use Handout #2 for participants to continue to take notes during this clip.	7 min.	All
Explore: Focus on Key Topics **Video: *District Perspective on Focused Curriculum***	Slides #13-14: Use Handouts #3-5 and video to explore "Focus on Key Topics." Slide #14: Have participants make a t-chart to evaluate the statement about math curriculum being a mile wide and an inch deep. What are pros/cons to that approach?	18-20 min.	Educational Leaders
Examine: Number Sense **Video: Preparation for Algebra**	Slide #15: View video of a seventh grade teacher's pre-algebra lesson to illustrate important skills, including number sense.	8 min.	Teachers
Differentiate: Number Sense **Video: Developing Number Sense in Kindergarten**	Slide #15: View video that describes number sense in Kindergarten. Use Handout #6 to show participants "The Missing Partner Game" CC*. This is a classroom connection for this module-take and use right away!	6 min.	Teachers
Differentiate: Number Sense	Slide #16: Use this video to explore number sense at the third grade level to see how	9 min.	Teachers

Video: Using Word Problems to Teach Number Sense	number sense applies to the varying grade levels. Pose questions listed in the presenter notes prior to viewing the video and allow for partner discussion after the video.		
Discuss	Slide #17: Use talking chips to have groups discuss Handout #7, Differentiated Student Assignments CC*.	15 min.	All
Explain **Videos: Teaching Fractions & Using Multiple Representations to Teach Fractions**	Slide #18: Participants will hear Dr. Wu describe teaching fractions as well as elementary and middle school teachers describe multiple representations to teach fractions. Participants will explain multiple representations after viewing the videos.	15 min.	All
Apply/Analyze	Slide #19: Participants will review a math problem and consider what students need to be able to do to solve the problem. Use Think-Write-Pair-Share for participants to work through this. Participants will analyze student work from Handout #8.	20 min.	Teachers
Evaluate **Video: Bradley Witzel MRI 2010 Clip #5**	Slide #20: Participants will, after viewing video, evaluate the use of a number line. Have participants discuss current uses and the use of an open number line.	10 min.	Teachers
Critic/Prioritize	Slide #21: Participants will use Handouts #10-13 to check the congruence between the benchmarks recommended by the NMAP and standards/curriculum currently in use in their district. They will review a planning template to summarize/evaluate this first recommendation (Mathematics Preparation for Algebra).	10 min.	Educational Leaders
<u>Comprehensive Instruction</u>			
Step	*Description*	*Time*	*Target Audience (All, Educational leaders, teachers)*
Introduce **Video: Developing Conceptual Understanding, Fluency, and Problem-Solving**	Slide #22: Introduce to participants the 2nd practice recommendation: Comprehensive Instruction. Participants will view video and highlight key ideas on Handout #14 which is a transcript of the video.	12 min.	All
Define Key Concepts	Slides #23-24: Use engagement strategies (ideas to use are in presenter's notes) to define key concepts for the 2nd practice recommendation, Comprehensive Instruction.	10 min.	All
Learn What Works **Video: Simultaneously**	Slide #25: Dr. Ferrini-Mundy discusses the interrelations between conceptual	16 min.	All

Teaching Conceptual Understanding, Computational Fluency, and Problem-Solving Skills	understanding, computational fluency, and problem-solving skills. Facilitate a discussion on what schools can do, what was shared about student motivation, and about the teacher's role in student motivation.		
Inquire **Video: An Administrator's Perspective on Mathematics Instruction**	Slides #26-27: Ask participants: why is it important to develop students understanding of number sense while at the same time developing fluency with facts? View video of principal sharing the role of number sense in transitioning to algebra while at the same time developing fluency with facts. Use Handout #15, Physical Ed. Lessons for Mathematics Practice, to illustrate how this large responsibility can become a shared responsibility across curriculums CC*.	8 min.	All
Prove **Video: Messages on Effort and Persistence** **Video: Stamina, Effort, and Success**	Slide #28: Prove that effort and persistence does matter when it comes to mathematics success. Show videos and have participants fill out the video response sheet-Handout #16. Have participants review Handout #17 and discuss effort, stamina, and persistence in small groups and conclude with participants sharing out to the whole group.	20 min.	All
Discuss	Slide #29: Use the questions posed on slide #29 and Handout #18-20 to analyze what we can do to help students and teachers with regard to the second practice recommendation, Mathematics Preparation for Algebra.	15 min.	All
Conclude	Slide #29: Use Handout #13 to conclude this second practice recommendation for Critical Foundations for Algebra.	5 min.	All
Mastery Framework			
Introduce **Video: Developing a Mastery Framework**	Slide #30: Introduce the third and final recommended practice for the module Critical Foundations for Algebra. Show video and have participants take notes as outlined in the presenter's notes. Use engagement strategy (in presenter's notes) to facilitate a discussion on formative assessments and how they organize/analyze the results.	21 min.	All
Define Key Concepts	Slides #31-35. Use engagement strategies for participants to identify key concepts of the last recommended practice, Mastery Framework.	7-8 min.	All

Learn What Works Video: Formative Assessment	Slide #36: Dr. Fuchs explains the 2 purposes and types of formative assessment. After viewing the video ask participants their reactions from the video.	12 min.	All
Learn What Works Video: Research-Based Instructional Programs	Slide #37: Dr. Fuchs explains the design features of researched-based instructional programs.	9 min.	All
See How it Works Benchmarks for Mastery	Slides #38-39: Use slides to highlight the Benchmarks for Mastery.	2-3 min.	All
See How it Works Formative Assessments Video: Reviewing Student Work	Slide #40: Participants add to their knowledge of formative assessments and can see how they are applied by teachers. Use Handout out #21 for participants to follow along with as you show the video and have participants make a t-chart to write benefits and challenges about reviewing student work.	8 min.	Teachers
See How it Works Formative Assessments Video: Formative Assessments on a Daily Basis	Slide #40: Continue to explore and learn more about formative assessments in action as a middle school teacher shares how her school integrates informal formative assessments into their daily lessons. Use Handout #22 which is a transcript of the video and use Handout #23 which is the example given in the video for participants to review.	8 min.	Teachers
See How it Works Working with All Students	Slide #41: Use Handouts #24-25 which are transcripts from videos (not used). These handouts are to be read for participants to learn about interventions for struggling students and for those who need acceleration. Each participant will read only one handout and then they will work with a partner to teach about the handout they read while their partner will tell about the other handout-jigsaw.	20-25 min.	Teachers
Do What Works Mastery Framework	Slide #42: Participants will use Handout #26 to discuss how this tool can be used and to assess our school's progress toward implementation.	3-4 min.	Educational Leaders
Discuss	Slide #43: Read discussion questions and allow time for participants to discuss and plan.	15-20 min.	All
Review	Slide #44-46: Use Handouts #27-28 to review tools designed to help teachers and schools tighten implementation of practices that help students who struggle in mathematics as well as strategies to accelerate those who may be	15 min.	All

	mathematically gifted.		
Apply	Slide #47: Have participants apply what they have learned by working on Handout #13 (planning template-school level). Now that all three recommended practices have been presented participants in teams can complete the planning template and identify next steps toward implementation.	25 min.	All
Conclude	Slides #48-49: Conclude the module by stating quotes from the National Mathematics Advisory Panel and sharing the resources used to create this module.	2 min.	All